

Healthy Drinking Waters for Rhode Islanders

SAFE AND HEALTHY LIVES IN SAFE AND HEALTHY COMMUNITIES

Radon in Private Drinking Water Wells

PRIVATE WELLS CURRENTLY ARE NOT REGULATED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA). Private well owners are responsible for the quality of their drinking water. Homeowners with private wells are generally not required to test their drinking water. However, they can use the public drinking water standards as guidelines to ensure drinking water quality. Refer to the factsheet *Drinking Water Standards* for more information.

There is currently no drinking water standard for radon. The EPA recommends that you take action when your home has an indoor air radon level of 4 picoCuries per Liter (pCi/L) or more. In states that educate the public about the



dangers of radon in air, EPA is proposing to allow public water suppliers to provide water with radon levels no higher than 4,000 pCi/L. This level of radon in water contributes about 0.4 pCi/L of radon to the air in a typical single-story home. However, EPA's proposal may require radon levels in drinking water to be no greater than 300 pCi/L in public water supplies if indoor air levels are not addressed through an aggressive public education campaign.



Summary

Radon occurs naturally in Rhode Island. It is a radioactive colorless, odorless, and tasteless gas. The major health concern for radon is from breathing elevated amounts in the air, which can cause lung

cancer. Although, there is a slight risk associated with ingesting water with elevated levels of radon, the primary concern is release of radon from normal water use into indoor air. The first step is to arrange to test your indoor air for radon. Depending on radon levels in the air you may want to arrange to test your drinking water. The treatment options for radon in water are aeration and the use of granular activated carbon filters.

Potential Health Effects

Exposure to radon gas does not yield immediate health effects. However, the long-term health effect of exposure to elevated radon levels in indoor air is the increased risk of lung cancer. Radon gas in indoor air is the second leading cause

of lung cancer. Drinking water that contains radon can present a risk for developing internal organ cancers, the leading one being stomach cancer. However, the risk of developing cancer from radon dissolved in water is smaller than the risk of developing cancer from radon released into the air.



There are several ways for radon to enter the home's air.

- The most common way is radon moving from the soil into the basement through cracks and other openings in the foundation and being released into the air. Homes that are built over bedrock containing radioactive materials are most susceptible to this. Sump pumps can also be a pathway for radon gas to enter the home.
- Radon may also be present in groundwater. Therefore homes that are served by bedrock wells are at a further risk for elevated radon levels in the air. Radon gas dissolved in water can be released to indoor air through normal household activities such as showering, dishwashing, and laundry. In this sense, radon is acting like carbon dioxide in a soda bottle that is released once the soda bottle is opened. Some radon may also stay in the water.
- Radon may also potentially be released into the air from building materials such as granite block foundations, some fireplace materials, and floor or wall tiles.

Indications of Radon in Drinking Water

Radon does not alter the taste, color, or smell of the water. Its effects on the human body are chronic in that they take time to develop. The only way to determine the presence of radon in well water is to test it. Water testing is recommended whenever indoor air levels of radon are 4 picoCuries or higher (whether a short-term or long-term test) to assist your radon mitigation contractor when designing a treatment system to suit your needs.

Sources of Radon in Air and Water

Radon is a radioactive, colorless, odorless, and tasteless gas that is formed through the breakdown of uranium in soil and rocks. Uranium is present as a trace element in granite rock. According to the Rhode Island Department of Health, (HEALTH), radon is present in elevated levels in about 23% of the indoor air screening tests done in Rhode Island homes, compared to about 7% of homes nationally.

Testing for Radon in Private Drinking Water Wells

HEALTH suggests that you arrange to test your indoor air for the presence of radon. Testing the home for radon in air is simple and inexpensive. If detected, the problem can be fixed. Radon air test kits that meet EPA guidelines are available at some retail outlets, laboratories, or through a certified radon measurement consultant. Information on how to purchase a radon detector or locate a radon mitigation contractor is available from the State Radon Office at (401) 222-2438.

If indoor air levels of radon are 4 picoCuries or higher, HEALTH suggests that you arrange to have your well water tested for radon at a state certified laboratory. Follow laboratory instructions carefully to avoid contamination and to obtain a good sample. If your well water contains elevated levels of radon, the levels that may be considered safe or unsafe depends on the levels detected in indoor air and whether you reduce indoor air levels. The design of a treatment system for radon in air should consider radon levels in water,



where applicable. Refer to the factsheet *Home Water Testing* for more information.

If you are served by a public drinking water system call your supplier and find out if your water comes from a surface or ground water source. If the water comes from a surface water supply most radon will have been released into the air before reaching your tap. If your water comes from a public groundwater supply, ask your supplier if radon is present in the water supply.

Interpreting Test Results

4,000 picoCuries of radon in water contributes roughly 0.4 picoCuries of radon to the air for a 1,000 square foot, single story home. The radon concentration in water will determine the type of water treatment option best suited for your situation.

Corrective Action

If there are elevated levels of radon in the water or air, Rhode Island Law requires that you contract with a Licensed Radon Mitigation Contractor to install treatment systems for water and air. HEALTH has an updated list of licensed contractors available to the public.

Whole house treatment, also known as point-of-entry treatment is the most effective way to remove radon from your water. Aeration and granular activated carbon filters are the two types of treatment options for radon removal in water. Granular activated carbon filters should only be used for water with radon levels less than 10,000 pCi/L. If carbon filters are used, the filters should be handled by a water treatment professional and properly disposed.

For more information on these treatment options, please see factsheets entitled:

- ◆ *Activated Carbon Treatment of Drinking Water Supplies*
- ◆ *Aeration Treatment of Drinking Water Supplies*

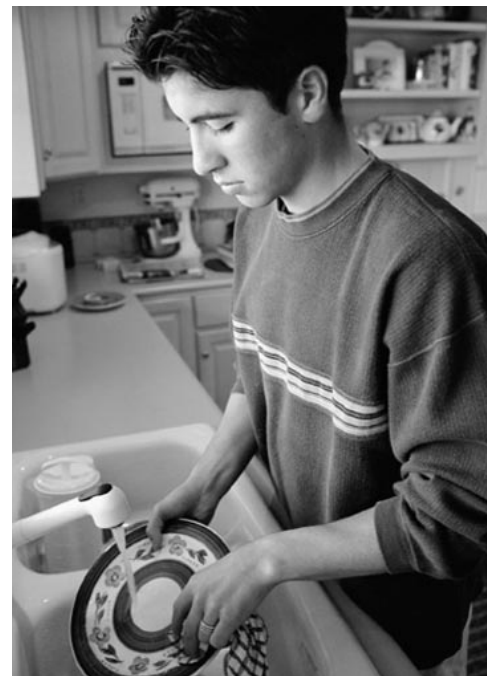
Consider both the initial cost and the operating costs. Operating costs include the energy needed to operate the system, additional water that may be needed for flushing the system, consumable supplies and filters, repairs, and general maintenance.

Regardless of the quality of the equipment purchased, it will not operate well unless maintained in accordance with the manufacturer's recommendations. Keep a log book to record equipment maintenance and repairs. Equipment maintenance may include periodic cleaning and replacement of some components. Also consider any special installation requirements that may add to the equipment cost. For more information, refer to factsheet *Questions to Ask When Purchasing Water Treatment Equipment*.



Protection of Private Drinking Water Supplies

You can protect your private well by paying careful attention to what you do in and around your home as well as your neighbor's activities near your well. Regular testing and adopting practices to prevent contamination can help ensure that your well supplies you and your family with good quality drinking water. For more information on well protection see the factsheet entitled *Drinking Water Wells*.



Treatment Options for Air

The most common removal method for radon in indoor air is soil-gas ventilation, which draws radon gas away from the foundation of the house. You can also use a preventative measure such as sealing off potential gas entryways (cracks in walls and floors) to help keep radon out. New construction may provide escape routes for gas generated beneath the foundation to further divert radon gas from entering the house.

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This project is a collaboration of the staff at HEALTH and the University of Rhode Island Cooperative Extension Water Quality Program.



For More Information:

This factsheet is one in a series on drinking water wells, testing, protection, common contaminants, and home water treatment methods. Contact the URI Home*A*Syst Program for more information.

University of Rhode Island Cooperative Extension Home*A*Syst Program

Offers assistance, information, and workshops on private well water protection. 401-874-5398 www.uri.edu/ce/wq

RI Department of Health, Office of Drinking Water Quality

Offers assistance, information on testing and state certified laboratories.

401- 222-6867 <http://www.health.ri.gov/environment/dwq/Home.htm>

For a listing of HEALTH's certified private laboratories in Rhode Island <http://www.health.ri.gov/labs/instate.htm>

US EPA New England website: <http://www.epa.gov/ne/eco/drinkwater/>

US Environmental Protection Agency. For a complete list of primary and secondary drinking water standards:

<http://www.epa.gov/safewater>

RI Department of Environmental Management, Office of Water Resources

Maintains listing of registered well drillers, information on well location and construction.

401-222-4700 <http://www.state.ri.us/dem/programs/benviron/water/permits/privwell/index.htm>

NSF International

For information on water treatment systems, NSF International has tested and certified treatment systems since 1965.

800-NSF-MARK <http://www.nsf.org/water.html>

Water Quality Association

The Water Quality Association is a not-for-profit international trade association representing the household, commercial, industrial, and small community water treatment industry. For information on water quality contaminants and treatment systems. www.wqa.org

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